Nota Lepi. 45 2022: 269–278 | DOI 10.3897/nl.45.87795 Research Article

The genus *Tegostoma* in Armenia, with description of a new species (Crambidae, Odontiinae)

Jan Šumpich[1], Ole Karsholt[2], Nikolay Savenkov[3], Hartmut Roweck[4]

1 *National Museum, Department of Entomology, Cirkusová 1740, CZ-193 00 Praha 9 – Horní Počernice, Czech Republic; jansumpich@seznam.cz*

2 *Zoological Museum, Natural History Museum of Denmark, Universitetsparken 15, DK-2100 Copenhagen, Denmark; okarsholt@snm.ku.dk*

3 *Latvian National Museum of Natural History, K. Barona st. 4, LV-1050 Riga, Latvia; nikolajs.savenkovs@lndm.gov.lv*

4 *Rendsburger Landstraße 71, D-24113 Kiel, Germany; hroweck@ecology.uni-kiel.de*

https://zoobank.org/46793BFE-1275-48AC-B805-6631D20A19C2

Received 15 June 2022; accepted 3 August 2022; published: 23 August 2022
Subject Editor: Théo Léger.

Abstract. A small but beautifully coloured species of *Tegostoma* Zeller, 1847, which was collected by the authors in Armenia, has turned out to be unnamed and is here described as *Tegostoma burtoni* sp. nov. The description is supported by morphology and DNA barcodes . Photographs of the adults and genitalia of both sexes are provided. *Tegostoma lepidalis* (Herrich-Schäffer, 1851) and *Pyrausta gulpembe* Kemal & Koçak, 2018 are recorded as new species for Armenia.

Introduction

The genus *Tegostoma* Zeller, 1847 comprises 31 species (Nuss et al. 2003–2022). The authors' concept accepts the synonymization of some genera with the genus *Tegostoma*, namely *Anthophilodes* Guenée, 1854 and *Anthophilopsis* Ragonot, 1891 as proposed by Amsel (1949: 305, 1970: 63), and this taxonomic status is also followed in Lepiforum (2008–2021). However, some current works consider these genera to be valid, including the genus *Aeschremon* Lederer, 1863 for *T. disparalis* (Herrich-Schäffer, [1855]), e.g., Slamka (2006) and Anikin et al. (2017). We follow the systematic arrangement proposed by Nuss et al. (2003–2022), however, we are aware that generic combinations of some taxa may not be final. Phylogenetic studies including the type species of all generic names are needed to shed more light on this issue.

The aim of this contribution is to present the description of a new species, which is very conspicuous by its external appearance. Apart from consulting relevant literature, we have continuously searched for this species in various museum collections, including the museums in Vienna, Berlin and St Petersburg, wrich in Lepidoptera from Armenia, and where it would be easily recognizable due to its striking colouration. As a result, we came to the conclusion that this is a hitherto undescribed species, the description of which we present here.

Materials and methods

Specimens

The study material collected was attracted at ultraviolet light (8W/12V tubes and 80W mercury vapour bulbs) installed in portable light traps.

DNA Barcoding

Tissue samples (dry legs) from specimens of *Tegostoma* and *Pyrausta gulpembe* were successfully processed at the Canadian Centre for DNA Barcoding (CCBG, Biodiversity Institute of Ontario, University of Guelph) (deWaard et al. 2008), resulting in 576-658 base-pair DNA barcode segments of the mitochondrial COI gene (cytochrome c oxidase 1). The sequences together with details of the sequenced voucher specimens were uploaded to the Barcode of Life Data Systems (BOLD; Ratnasingham and Hebert 2007). Degrees of intra- and interspecific variation of DNA barcode fragments were calculated under the Kimura 2-parameter model of nucleotide substitution using the analytical tools of BOLD. A neighbour-joining tree of DNA barcode data of selected taxa (Fig. 13) was constructed using MEGA 6 (Tamura et al. 2013) under the Kimura 2 parameter model for nucleotide substitutions.

Photographic documentation

The pinned specimens were photographed with a Canon 750D camera and a Canon MP-E-65 mm lens. Genitalia preparations were photographed with a Canon EOS 200D camera mounted on an Olympus CX31 stereomicroscope.

Terminology

The descriptions of the genitalia and the descriptions of the wing patterns are based on the terminology in Slamka (2006, 2013).

Abbreviations of collections

ECKU Collection of Ecology-Centre, Kiel University, Germany
LNMNH Latvian National Museum of Natural History
NMPC National Museum, Prague, Czech Republic
NRC Collection of Nature Research Center, Vilnius, Lithuania
ZMUC Zoological Museum, Natural History Museum of Denmark, Copenhagen, Denmark

Results

Tegostoma burtoni sp. nov.

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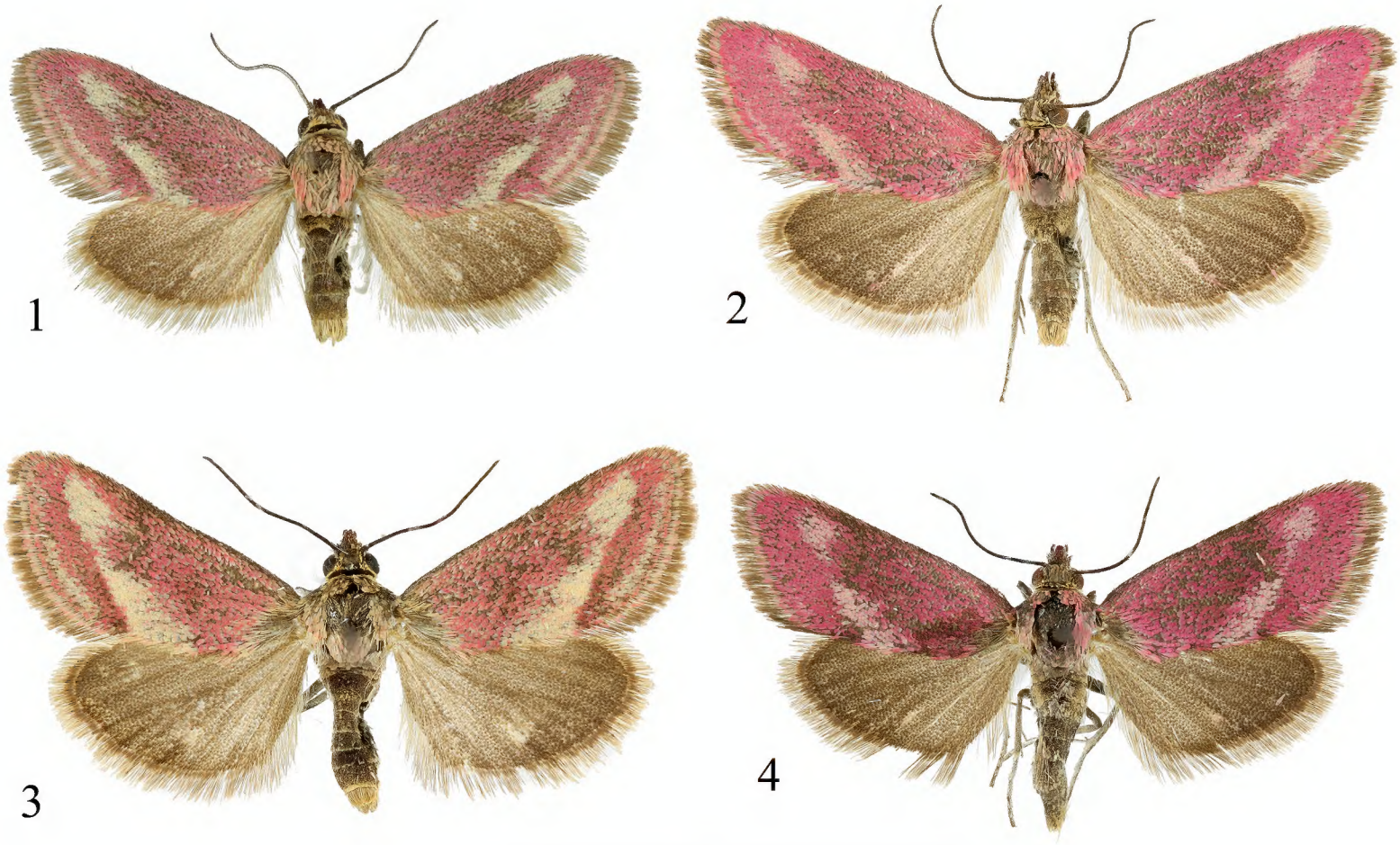
Figs 1–12

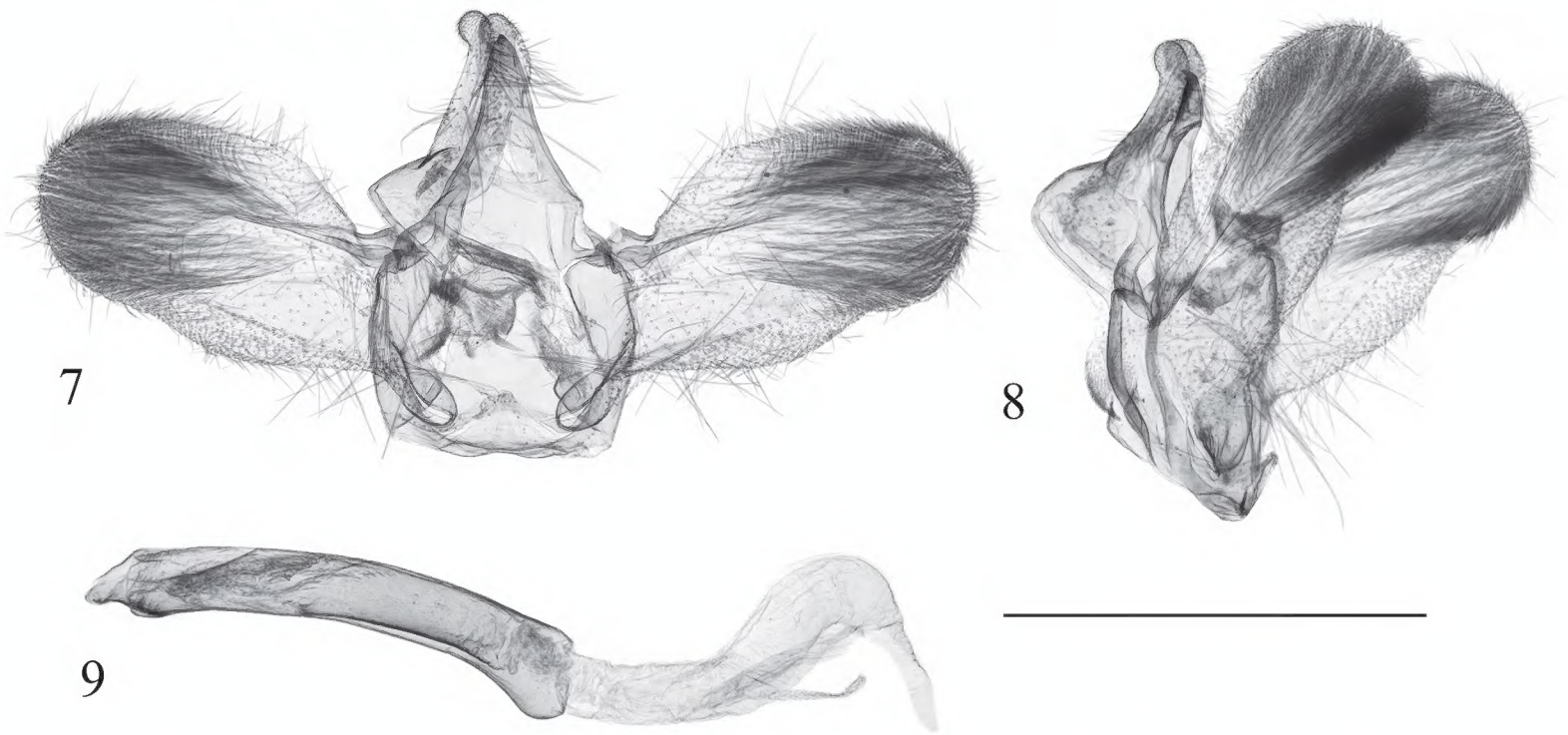
Material examined. Type material. ***Holotype*** ♂: Armenia mer., Vedi env., Goravan vill., Gorovan Sands, 956 m, 39°53'20"N, 44°43'58"E, sandy steppe, 31.v.2017 (Barcode NMPC-Lep-0714), Jan Šumpich leg. (NMPC). ***Paratypes*:** 40 ♂, 5 ♀, same data as holotype (gen. slides 22025, 22026 and 22027 J. Šumpich) (Barcode NMPC-Lep-0713) (NMPC); 71 ♂, 13 ♀, same data as holotype, but 910 m, 39°53'35"N, 44°43'03"E, 25.–27.v.2019, O. Karsholt, H. Roweck & N. Savenkov leg. (ECKU, ZMUC, LNMNH).



Figures 1–6. *Tegostoma burtoni* sp. nov. **1–4.** Adults: **1.** Holotype, male; **2–4.** Paratypes; **2–3.** Males; **4.** Female; **5–6.** Head (enlarged): **5.** Male; **6.** Female. All coll. NMPC.

Diagnosis. *Tegostoma burtoni* sp. nov. is similar to some other *Tegostoma* species, mainly *T. lepidalis* (Herrich-Schäffer, 1851), and to *Pyrausta gulpembe* Kemal & Koçak, 2018 in external appereance, but it differs by its smaller wingspan. It differs from all *Tegostoma* species of comparable size by the distinctive purple colour of the forewings.

Description. ***External appearance*** (Figs 1–6, 12). Forewing length ♂: 13.4–15.0 mm (mean 14.8), ♀: 14 mm. Vertex covered by ochreous scales, maxillary palpus short, brown with yellowish scales, collar of yellow scales around the eyes and the caudal border of the head. Antennae filiform ciliate, cilia whitish, flagellomeres black dorsally but distinctly white ventrally, scape brown, yellowish ventrally. Patagia, tegulae and thorax usually pinkish to purplish, with admixtures of brownish scales. Forewings pinkish to purplish with discontinuous pale postmedial fascia and a very narrow pale subterminal fascia, often not present; postmedial fascia pale buffish almost



Figures 7–9. Male genitalia of *Tegostoma burtoni* sp. nov. **7.** Ventral view; **8.** Lateral view; **9.** Aedeagus. Scale bar: 1 mm.

parallel to termen and of irregular width, subterminal fascia pale buffish almost parallel with termen. Fringes brown, proximal third paler. Hindwings brown, distinctly darker near margin, distinctly paler basally. Fringes ochreous, brown in the basal third.

Variation. Sexual dimorphism not observed, it seems females differ in smaller size and less pronounced light fascia. The ground colour of most specimens is pinkish to purple, however, this is less pronounced in some specimens. Both fasciae are always paler compared with the ground colour but in some specimens they can be yellowish-buff, not pinkish. Specimens with a pinkish streak usually do not have a pale marginal line.

Male genitalia. (Figs 7–9). Valva 1.6 times as long as wide, ovoid, dorsal margin slightly convex, sacculus slightly rounded caudally, rounded apex with a setose tuft. Saccus nearly rectangular with a slightly concave depression. Tegumen triangular, distinctly protuberant posteriorly, uncus bilobed, lobes rounded distally, gnathos strongly sclerotised, narrow, with two points on the distal margin, not reaching the distal margin of the uncus. Vinculum elongate, slightly more than twice as broad as long. Aedeagus narrow, slightly curved, bluntly pointed; vesica stoutly compressed in distal third resembling a broad, oblong cornutus ["denticulate plate" sensu Slamka (2013)], bulbus ejaculatorius membranous, as wide as aedeagus, without lamina.

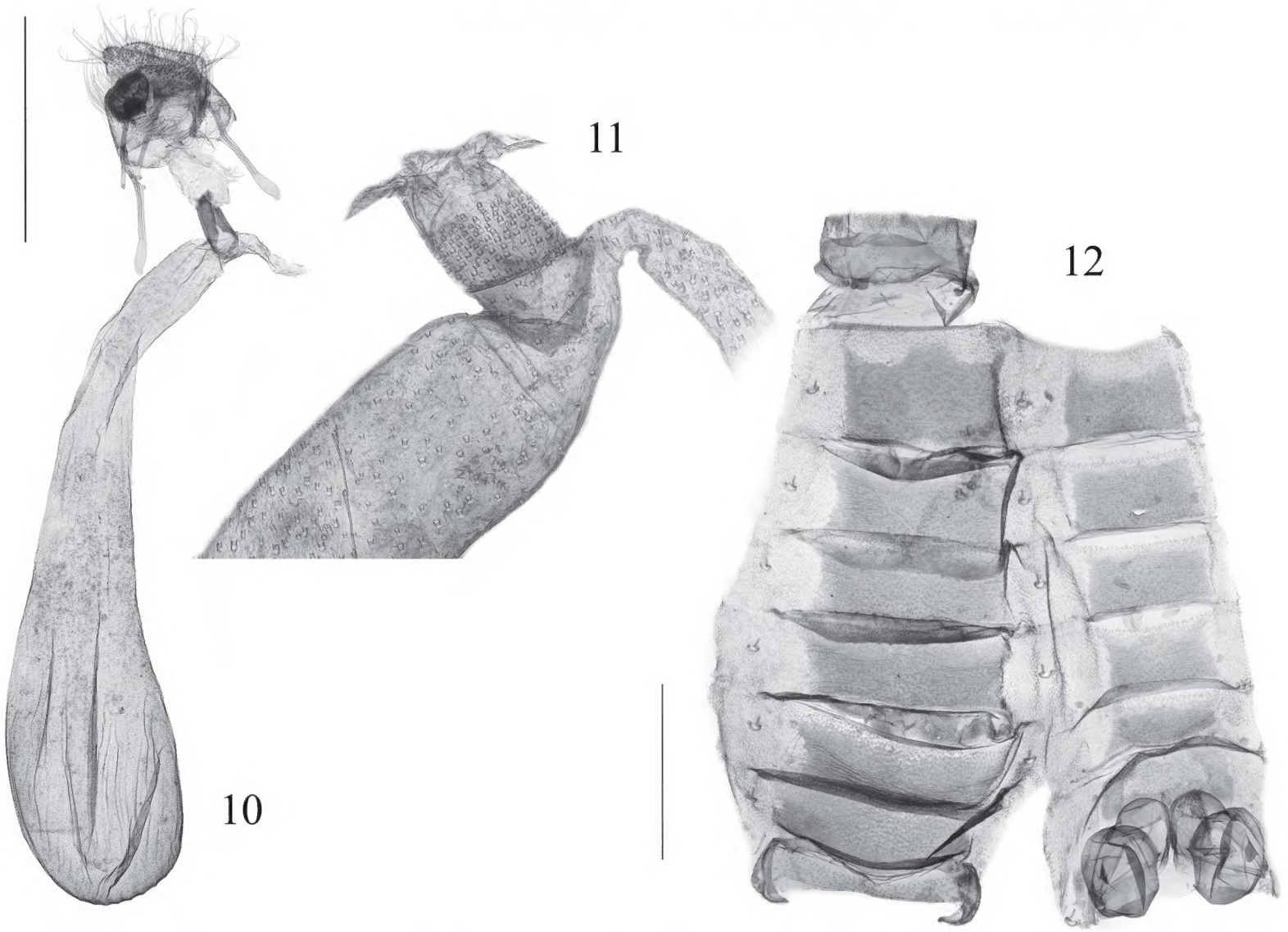
Female genitalia (Figs 10–11). Papillae anales rectangular, slightly elongate laterally,

apophyses posteriores short, 2/3 the length of the apophyses anteriores. Ostium bursae broad, membranous. Antrum narrow, sclerotised, in the shape of a coiled leaf. Ductus bursae comparatively narrow, membranous, continuously gradually expanding anteriorly, and eventually becoming the bursa copulatrix, which is an elongate ovoid, membranous, without signa.

Molecular data. BIN: BOLD:AEL8899 (n = 2). The intraspecific average distance of the barcode region is 0.0% (n = 2). The minimum distance to the nearest neighbour, *Tegostoma lepidalis*, is 3.24% (Fig. 13).

Distribution. Armenia.

Biology. The new species was collected in sandy habitats with sparse vegetation at an altitude of about 1000 m (Fig. 16). The type locality, Gorovan Sands is one of the steppe habitats in



Figures 10–12. Female genitalia and male abdomen of *Tegostoma burtoni* sp. nov. **10.** General view of the female genitalia; **11.** Detail of ostium area (different view of the same genitalia slide, photographed before being removed from the abdomen), enlarged; **12.** Male abdomen (open view). Scale bar: 1 mm.

Armenia, areas which have not been intensively cultivated until recently. For more details see following Section.

Etymology. The species name is derived from the name of John Andrew Burton, a worldwide active conservationist, in honour of his strong support of establishing nature reserves in Armenia. It is to his merit to have established the Artsakh Nature fund and that more than 30,000 hectares of unique habitats are now protected within the borders of the Caucasus Wildlife Refuge.

Note. The nature reserve is named after the old name of the village Gorovan, which has later become Goravan. But the official name of this protected area remained in its original spelling. Therefore, the names of the municipality and the protected area differ.

Brief characterization of Gorovan Sands – the type locality of the new species

The National Sanctuary Gorovan Sands was established in 1959 in order to protect the habitats for endangered animals, as well as the site conditions with their unique vegetation. One of the most typical ecosystems of the arid zone are sandy *Artemisia* semi-deserts with a fauna and flora well adapted to extreme drought and temperature variation. Gorovan Sands Sanctuary, with roughly 175 (originally ca 200) ha, represents the largest of this type in the whole of Armenia. Like other deserts of this type it is dominated by cold winters, dry and hot summer months and an annual precipitaion of just 200–300 mm.

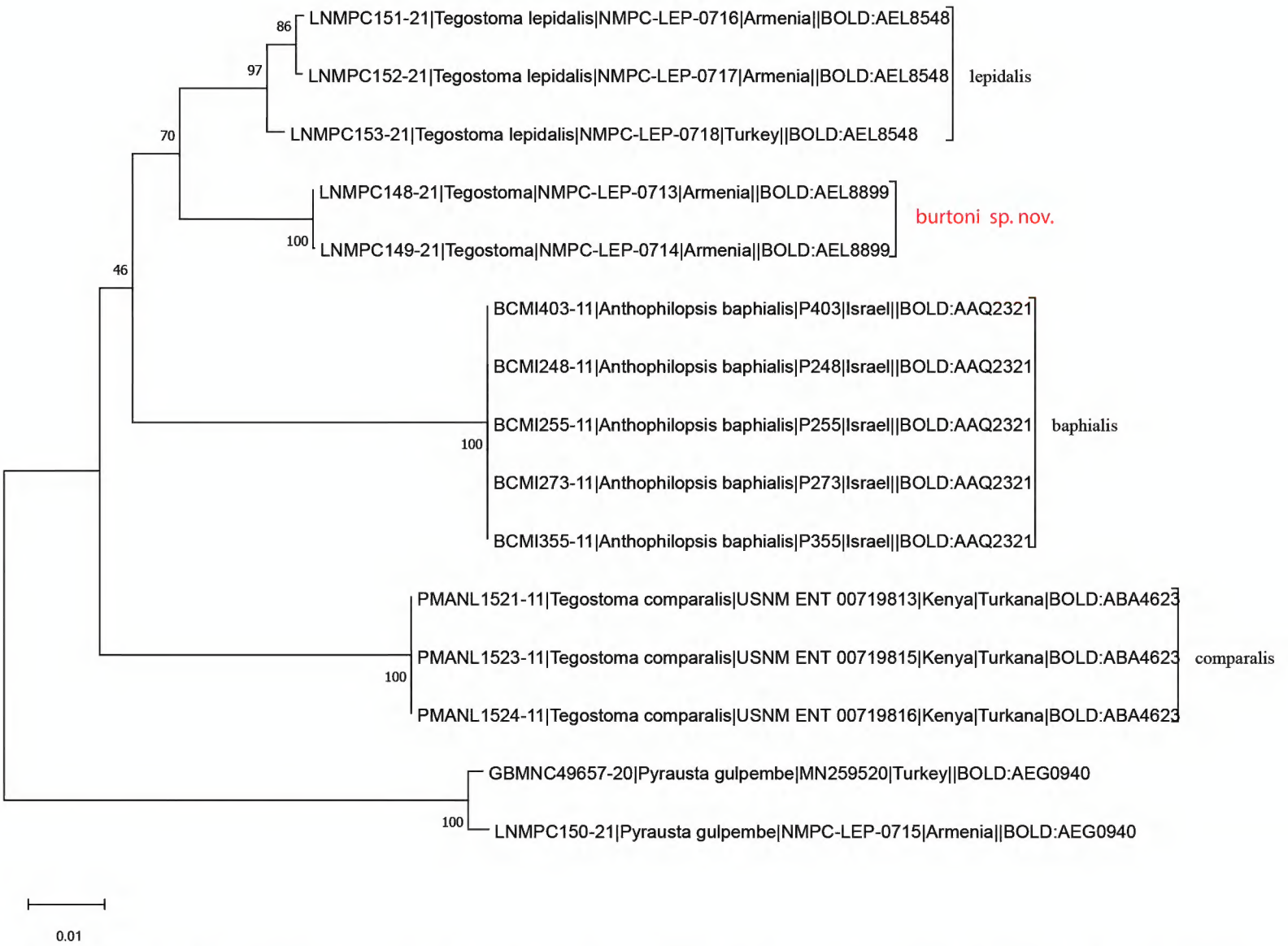


Figure 13. Neighbour-joining tree based on publicly available DNA barcodes of identified *Tegostoma* specimens with *Pyrausta gulpembe* Kemal & Koçak, 2018 as an outgroup species (for details see Material and methods).

The vegetation is dominated by tussocks of *Artemisia fragans*, *Achillea tenuifolia*, saltresistant plants such as *Salsola* ssp., *Kochia prostrata*, *Ziziphora tenuior*, *Calligonum polygonoides*) and other, mainly psammophytic plant species, which show a huge variety of adaptation to sandy site conditions with a poor supply of nutrients and extreme dry periods, mixed with a wider spread of generalist species of cultivation (such as the locally dominant *Lepidium vesicarium*). About 160 species of vascular plants have been recorded (Tadevosyan 2001), among them at least 12 species listed in the Armenian Red List. It is the only known site in Armenia for *Calligonum polygonoides*, the foodplant of the local endemic species *Pharaonus caucasicus* (Reitter, 1888) (Coleoptera, Scarabaeidae), which is currently only known to occur in Gorovan Sands (Keith et al. 2015). Unfortunately branches and roots of this plant are intensively collected by local people for burning. An additional stressor for this plant is the rather uncontrolled grazing by domestic animals (mainly goats and sheep).

Besides overgrazing and a rather intensive collecting of edible plants by local people, even more important for the future of this sanctuary is to keep reclamation, sand and travertine mining, dumping, and offroad driving within boundaries and thus allow processes of regeneration on the remainder of the site.

List of *Tegostoma* Zeller, 1847 recorded in Armenia

Tegostoma albizonalis Hampson, 1900

Distribution. Armenia, Turkmenistan (Hampson 1900).

Remarks. Part of type series originated from Armenia.

Tegostoma burtoni sp. nov.

Material examined. (see above).

Distribution. Armenia (this paper).

Tegostoma comparalis (Hübner, 1796)

Material examined. Armenia, Gorovan Sands, 910 m, 39°53'35"N, 44°43'03"E, 4 ♂, 2 ♀, 25.–27.v.2019, O. Karsholt & N. Savenkov; prov. Ararat, Urtsadzor, Caucasus Wildlife Reserve, Eco Lodge, 1250 m, 39°56'58"N, 44°53'14"E, 1 ♂, 22.–30.v.2019, O. Karsholt, H. Roweck, & N. Savenkov leg. (ZMUC).

Distribution. Southern Europe (Karsholt and Razowski 1996), Russia (SW parts) (Sinev and Streltzov 2019).

Tegostoma disparalis (Herrich-Schäffer, [1855])

Material examined. Armenia, Gorovan Sands, 910 m, 39°53'35"N, 44°43'03"E, 5 ♂, 1 ♀, 25.–27.v.2019, O. Karsholt & N. Savenkov (ZMUC).

Distribution. Turkey (Herrich-Schäffer 1843–1855), Southern Caucacus (Martin 1986), Armenia (Slamka 2006).

Tegostoma lepidalis (Herrich-Schäffer, 1851)

Fig. 14

Material examined. Armenia, Ararat Province, National Park of Khosrov, Vedi River Valley, 1298 m., 9.vi.2015, 1 ♂, 1 ♀ (barcode data NMPC-Lep-0717, NMPC-Lep-0716), P. Vicherek leg. (NMPC).

Distribution. Turkey (Herrich-Schäffer 1851), Iran (Amsel 1961), Armenia (this paper).

Tegostoma ruptilineale Zerny, 1914

Distribution. Armenia (Zerny 1914).

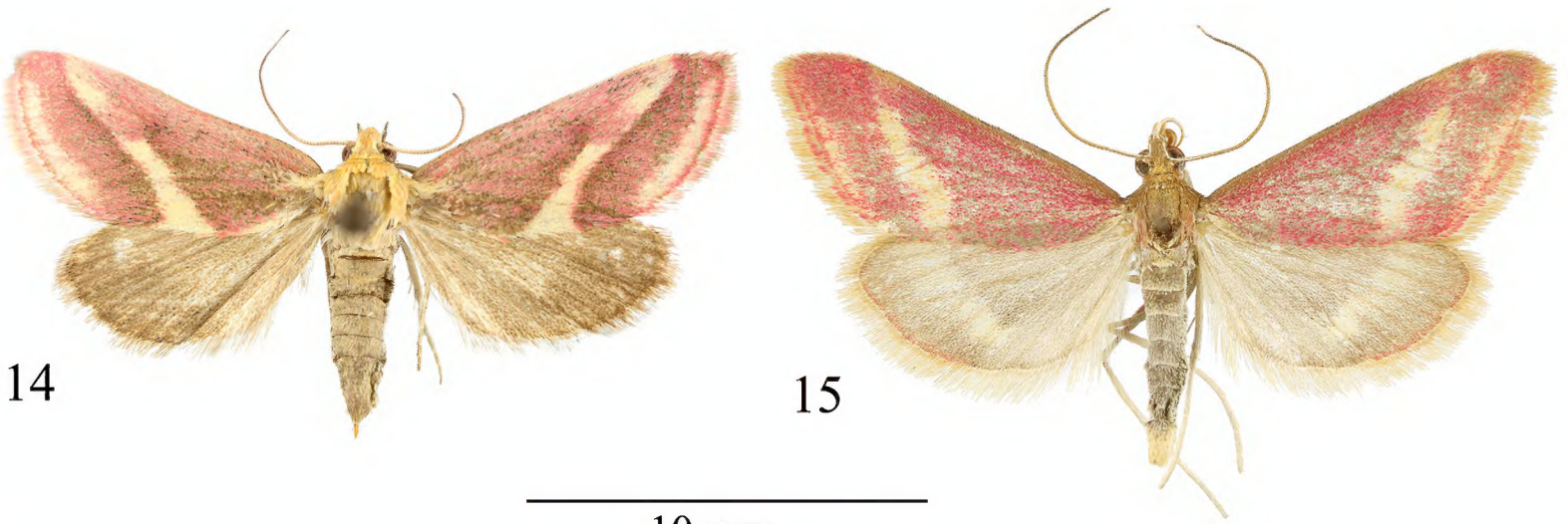
Remarks. The species was described from Armenia.

Faunistic data for *Pyrausta gulpembe*, used as an outgroup in the phylogenetic tree

Pyrausta gulpembe Kemal & Koçak, 2018

Fig. 15

Material examined. Armenia, Areni env., Noravank monastery, 2.vi.2017 (Barcode NMPC-LEP-0715), J. Šumpich leg. (NMPC); Armenia, prov. Ararat, Urtsadzor, Caucasus Wildlife Reserve, Eco Lodge, 1250 m, 39°56'58"N, 44°53'14"E, 1 ♂, 1 ♀, 22.–30.v.2019, O. Karsholt, H. Roweck & N. Savenkov leg. (ZMUC); 3 specimens (not sexed), the same locality but 26.iv.–7.v.2022, H. Roweck & N. Savenkov leg. (ECKU); 1 specimen (not sexed), the same locality and date but P. Ivinskis leg. (NRC).



Figures 14–15. Comparative specimens. **14.** *Tegostoma lepidalis* (Herrich-Schäffer, 1851), Armenia (barcoded); **15.** *Pyrausta gulpembe* Kemal & Koçak, 2018, Armenia (barcoded).

Figure 16. Gorovan Sands near Vedi in Armenia, habitat of *Tegostoma burtoni* sp. nov. (Photo A. Pavlíčko).

Molecular data. BIN: BOLD:AEG0940. The intraspecific average distance of the barcode region is 0.48% (n = 2). The minimum distance to the nearest neighbour, unidentified *Evergestis* Hübner, [1825] from Iran (BOLD:AAH6764), is 5.61% (p-dist).

Distribution. Turkey (Kemal and Koçak 2018), Armenia (this paper).

Acknowledgements

We thank Alois Pavlíčko (Prague, Czech Republic) for providing a photograph of the sandy habitat of the new species and Povilas Ivinskis, Nature Research Center (Vilnius, Lithuania) for providing his faunistic records. Flemming Vilhelmsen, ZMUC is thanked for helpful information. The field investigations were conducted in collaboration with Scientific Center of Zoology and Hydroecology (National Academy of Sciences of Armenia). We also thank Ruben Khachatryan (Director of the Armenian Foundation for the Preservation of Wildlife and Cultural Assets) and Mark Kalashian (Scientific Center of Zoology and Hydroecology, Yerevan, Armenia) for their strong support of our field work. The first author expresses his gratitude to Gayane Karagyan (Scientific Center of Zoology and Hydroecology, Yerevan, Armenia) for his company during the trip to Armenia and for the direction to the important Armenian sites. We are grateful to Stella D. Beavan (Zeal Monachorum, UK) and Robert J. (Bob) Heckford (Plymouth, UK) who improved the English language and provided many useful comments to the text. We also thank reviewer Richard Mally for helpful comments and editor Théo Léger for careful review of the text. J. Šumpich carried out his part of the work on this article with support from the Ministry of Culture Czech Republic (DKRVO 2019–2023 / 5.I.d, National Museum, 00023272).

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